BEFORE THE HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of proposed Plan Change G: Aokautere Urban Growth to the Palmerston North City Council District Plan

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STATEMENT OF REPLY EVIDENCE OF ALLISON REIKO BAUGHAM ON BEHALF OF PALMERSTON NORTH CITY COUNCIL

TECHNICAL - STORMWATER

Dated: 28 November 2023

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REPLY EVIDENCE OF ALLISON REIKO BAUGHAM

A. INTRODUCTION

[1] My full name is Allison Reiko Baugham.

[2] I prepared a s 42A report dated 15 September 2023 with Tony Miller on Technical Stormwater (**s 42A Report**) on behalf of the Palmerston North City Council (**Council, PNCC**) for proposed Plan Change G: Aokautere Urban Growth to the Palmerston North District Plan (**PCG**).

[3] My experience and qualifications are set out in my s 42A Report.

[4] In this reply evidence I use the same defined terms as in my s 42A Report.

[5] I repeat the confirmation given in my s42A Report that I have read and will comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023, and that my report has been prepared in compliance with that Code.

[6] I attended a pre-hearing meeting on 27 September 2023 on the topic of stormwater, erosion, hydrology/flooding, land stability, ecology. I also met with Rangitāne on 12 October 2023 to discuss the stormwater strategy and process. Separately I met with Horizons Regional Council (Horizons) on 12 October 2023 on the topic of stream classification and stormwater management. I also was scheduled to attend expert conferencing on 14 November 2023 with Jack Out, however he declined to meet despite my best efforts to engage with him.

B. SCOPE

[7] My reply evidence responds to points made in evidence (and in the case of Ms Gear, pre-hearing meeting notes) by:

(a) Rosemary Gear on behalf of Rosemary and Anthony Gear (Submitter 39) regarding stormwater effects on streams, the proposed stormwater mitigation measures, and additional mitigation requested;

(b) Brett Guthrie (Submitter 41) on behalf of themself regarding erosion and land stability effects on Moonshine Valley;

(c) Christle Pilkington on behalf of Palmerston North Industrial and Residential Developments Ltd (now Brian Green Residential Developments Ltd) (Submitter 45) regarding the vesting of gullies;

(d) Amanda Coats on behalf of Heritage Estates (2000) Ltd regarding the detail of information provided and feasibility of proposed mitigation measures;

(e) Jack Out on behalf of Heritage Estates (2000) Ltd regarding the details of the proposed mitigation measures and staging of the Council-led works in relation to development;

(f) Paul Thomas on behalf of CTS Investments Ltd, Woodgate Ltd, and Terra Civil Ltd (Submitter 58) regarding the proposed Gully 1 stormwater mitigation, feasibility of Council delivering the required infrastructure, the overall stormwater management strategy, and proposed works on the promontories; and

(g) Les Fugle on behalf of CTS Investments Ltd, Woodgate Ltd, and Terra Civil Ltd (Submitter 58) regarding the perimeter swale, proposed mitigation in Gully 1, and the proposed wetland feature.

[8] The fact that this reply statement may not respond to every matter raised about stormwater should not be taken as acceptance of the matters raised. Rather, I rely on my s 42A Report generally, and the technical assessments to address these matters.

C. RESPONSE TO ROSEMARY GEAR ON BEHALF OF SUBMITTER 39

[9] Concern was raised around the effects of the development in relation to stormwater, as well as additional mitigation recommendations.

Silt and stormwater flowing into Moonshine Valley Stream

[10] A useful history has been provided by Ms Gear[1] that further highlights the shared concerns with erosion in the gullies. The sensitivity of the gullies and the effects development has had to date have been acknowledged and addressed in the

[1] Submitter Statement by Rosemary Gear, page 1.

Stormwater Management Strategy. I wish to begin by briefly reiterating a premise of my s 42A Report, that while PCG rules are intended to both manage, and to some extent remediate, the effects of development, it should be kept in mind that without development erosion would still occur. Accordingly, the stormwater mitigation presented is intended to manage the *rate* of erosion and not prevent it entirely.

[11] As I note in the s 42A Report, the Stormwater Management Strategy has been set to match predevelopment flows within Aokautere as it relates to the erosive forces of the flow; that is, the rate of erosion is not accelerated as a result of development. However, erosion within the gullies will continue (that is, erosion is occurring regardless of development).[2]

[12] The technical reporting carried out to inform my s 42A Report has further highlighted the sensitivity of the gullies and their susceptibility to erosion. This has led to a range of changes to the Stormwater Management Strategy and Structure Plan/Provisions, as discussed in the s 42A Report. This includes refinements and additions to the stormwater controls proposed in the Stormwater Management Strategy to supplement the original stormwater concept design. These changes will ensure that the design criteria and objectives set out in the Stormwater Management Strategy are met,[3] while accounting for the updated modelling (including the predicted range of downcutting).

[13] I remain comfortable with the stormwater management approach and am of the view that the design specifications in the Stormwater Management Strategy continue to be valid, as specified/reflected in the policy framework and performance standards. I have recommended to Ms Copplestone that there is a direct link to the Stormwater Management Strategy in the methods within the District Plan to ensure the community and users of the plan understand the context and reasons for the policy framework. Specifically:

(a) The sensitivity of the receiving environment and need to determine the erosive effects of stormwater runoff; and

[2] See paragraph [46] of the s 42A Report.
[3] Stormwater Management Strategy, at 5.1. See also paragraphs [45]-[61] of the s 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023.

(b) Hydraulic neutrality for the Aokautere Greenfield Area refers to both peak stormwater runoff rates and the erosion threshold exceedance cumulative effective work index.

[14] I note that the Rules regarding stormwater management within the PCG area reference PNCC's *Engineering Standards for Land Developments* (**ESLD**) for the design storm and climate change projection to be used for the Stormwater Management Plan. This reference is important because it will ensure that the latest recommendations and projections will be used (i.e., improved climate change predictions, guidance on the rainfall hyetograph for the design storm[4]).

Response to proposed mitigation requirements

[15] Two topics were raised in the evidence (submitter statement) of Ms Gear, being permeable surfaces and the ownership of the perimeter swales.

(a) Permeable surfaces: A limit to permeable surfaces has been proposed as part of PCG, being 40% in the suburban low density areas and 25% in the medium density village area. As stated in the s 42A Report (at paragraph [55]), this results in an overall permeable area estimated to be 37% based on the densities identified in the Structure Plan. I understand that this is a higher limit than proposed in other parts of the City (at 30%), which is a reasonable design parameter due to the sensitivity of the receiving environment. I accept that it can be difficult to monitor impervious surfaces outside of the subdivision/consenting process. Given the sensitivity of the receiving environment, achievement of the stipulated standard/limit is important for stormwater management. In my opinion the design specifications in the Stormwater Management Strategy provide a level of conservatism that will manage the potential for non-consented impervious area increases in the future.

[4] Rainfall hyetographs represent the distribution of rainfall intensity over time. For engineering design, the hyetograph can be based on a "nested" design storm (Chicago Storm), temporal pattern, or any other pattern that is appropriate for the application. For example, nested design storms are typically used for sizing reticulated networks, however a temporal pattern may be more appropriate for sizing attenuation volumes. Sensitivity checks using the different hyetographs are typically recommended for sizing storage volumes.

(b) Swale ownership: From a stormwater perspective, the Council's preference is to have these corridors vested to Council. However, I understand from Ms Copplestone that the Rules have been drafted so as to provide flexibility for either Council ownership or private ownership of the swale. Further, even if the swales were retained in private ownership, the Council would be responsible for maintenance. In order to enable this, continuous access along the entire length of the corridor must be provided. This will help protect the function of these corridors in the event that the land is not vested in Council. I understand Ms Copplestone has recommended changes to the policy framework to make this requirement for continuous access more explicit.

D. RESPONSE TO BRETT GUTHRIE ON BEHALF OF SUBMITTER 41

[16] Although the submitter is supportive of PCG, concern was raised around the potential earthworks and land contouring on the promontories, and that the previous regulatory framework has been insufficient to control the effects of this type of development.[5]

[17] Setbacks are required through PCG to manage geotechnical, stormwater, and visual effects. The setbacks for stormwater and geotech are dependent on the nature and extent of the earthworks proposed and I understand that the proposed subdivision and land use rules require a site-specific geotechnical site investigation. This will provide Council with the ability to require the developer to address land stability and erosion effects as a result of any part of the development (including earthworks).

[18] In addition, I have recommended amendments to proposed Appendix E (Cross-Section Options) of the s 42A Report that was recommended to be included in the plan provisions. I consider these amendments are necessary to clarify the purpose of the setback for the stormwater perimeter swale. The proposed changes include:

(a) Removal of the 20-degree, 25-degree and 30-degree setback lines shown from the bottom of the gully. There is a risk these will create confusion given the setback lines shown in the Aokautere Structure Plan (Map 7A.4) are based on future projected downcutting and not the current bed.

[5] Statement of Evidence of Brett Guthrie dated 27 October 2023 at pp 2-3.

(b) A note on the dimensions clarifying that this is an example of what the perimeter swale could look like, however it is subject to site-specific design. This change reflects the fact that the size of the swale is dependent on the catchment size and geotechnical considerations and will therefore vary on a case-by-case basis.

(c) The title be changed from "Cross-Section *Options*" to "Cross-Section *Examples*". The intention of the figure is to demonstrate the purpose of the perimeter swale and demonstrate how it could look in practice; it is not intended to be the only acceptable solution.

(d) Following on from the above, an explanatory note on the figure, clarifying the purpose of the perimeter swale and how it relates to the piped reticulation is proposed to be added to the cross section. I consider this is necessary to demonstrate that the majority of the runoff, especially that generated by impervious surfaces such as the roofs, should be directed to the road corridor and not the gully.

[19] I am of the opinion that this amended Figure (refer to **Attachment A**), will help clarify the purpose of the perimeter swale.

[20] In order to provide clarification around the width of the perimeter swale, minor amendments are recommended to Policy 4.10 and 4.11 to explain that the width of the corridor will also need to consider ongoing access and maintenance.

[21] The above clarifications and amendments help highlight that specific design is required for any development, thereby managing the risk of unmonitored earthworks.

E. RESPONSE TO CHRISTLE PILKINGTON ON BEHALF OF SUBMITTER 45

[22] Comments were provided around the vesting of gullies at paragraphs [51]-[62] in Ms Pilkington's evidence. In particular, the sequencing of development as it relates to individual development and the financial contributions from Council.

Sequencing of development

[23] Concern was raised around vesting of the gullies, and that they should only be vested "*where they are contiguous to an area of land proposed to be subdivided*".[6] While I cannot comment on the intricacies of the vesting process, my advice from a stormwater perspective is that the stormwater management measures anticipated as being required for these gully systems must be in place prior to any development that will be relying on these gully networks. In light of the particular sensitivities of Gullies 1 and 2, ensuring that the necessary infrastructure is in place to enable development at an early stage is important.

[24] In my opinion it is important to acknowledge the sensitivity of the gullies and prioritise the implementation of effective stormwater management in the gullies over expedited development. It is my view that when gullies are to receive stormwater from a development, the necessary infrastructure must be in place beforehand. This is consistent with the approach set out in the s 42A Report where it is recorded that development should commence in the upstream catchment until the necessary receiving infrastructure is in place.[7] The provisions make clear that residential development should not commence until the stormwater mitigation works, including those in the gullies, are in place to receive and manage runoff. In my view, allowing development to proceed in instances where stormwater relies on gully access ahead of Council investment is not appropriate.

[25] In relation to paragraph [58] in Ms Pilkington's evidence, I am further concerned as to the developer's ability to effectively manage and meet the required standards of development without the essential work being carried out in the gullies, and accordingly I do not agree with this submitter as to the implementation relying on a 'developer-led' approach.

Financial contributions

[26] A query was raised regarding Council's financial contribution outside of the gully network. As per Appendix B of the s 42A Report, Council-led infrastructure is confined

6 Statement of Evidence of Christle Pilkington dated 27 October 2023 at [54].
7 Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023 at [64](c).

to the gullies, with stormwater infrastructure on the promontories intended to be developed and delivered as part of development. These projects have been added to Council's draft work programmes for the next Long Term Plan (LTP) (2024-2034).

[27] Stormwater infrastructure that is required to be delivered by the developer may need to service more than just their land or the individual development. Any developer would be required to consider the upstream catchment when installing infrastructure. However, that does not necessarily mean the developer is required to pay for the upgrade required to service future upstream development. Section 6.1.1 of PNCC's ESLD (March 2023) states that:

> the Developer must meet all costs of new stormwater systems. The Council may consider, at its discretion, contributing to proposed works in cases where additional capacity or extensions to the system are required to serve areas outside the site and its upstream catchment.

[28] In my opinion there are no further amendments required to the Plan Provisions.

F. RESPONSE TO AMANDA COATS ON BEHALF OF SUBMITTER 51

[29] The evidence presented focuses on perceived gaps identified by Ms Coats. Gaps relating to stormwater are discussed below.

Identification of stormwater features

[30] The evidence states that the detention ponds are not labelled on Structure Plan Map 7A.4, making it difficult to cross-reference the ponds to the reports.[8]

[31] Both the notified s 32 stormwater report (Figure 5.2, *Stormwater Management Strategy: Plan Change G – Aokautere*, GHD, 23 May 2022) and the updated technical memo (Figures 2A through 2D, *Model Update – Technical Memo: Aokautere Plan Change G*, GHD, 30 August 2023) provide figures with labels for each of the proposed ponds. This can be referenced back to the Structure Plan Map 7A.4.

[32] The Structure Plan Map does not label individual ponds. This reflects the high-level nature of the notified Stormwater Management Strategy, the purpose of which is to

[8] Statement of Evidence of Amanda Coats dated 3 November 2023, at [10](a).

identify the risks, constraints, and mitigation requirements to enable development of the plan change area. The solutions presented are conceptual in nature, and not intended to be the only feasible solution. Although Structure Plan Map 7A.4 shows the indicative footprints of the ponds identified in the stormwater technical reports, the volume, footprint and location are dependent on each development, and are likely to be sized differently than the original concept.

[33] Overall, I do not consider it necessary to label the ponds on the Structure Plan.

Constructability of proposed infrastructure

[34] The constructability of the detention ponds is raised, noting that it would "*require hard engineering solutions*" to provide the ponds in the locations shown in the Structure Plan.[9] Ms Coats also questions the proposed location of some of the ponds.[10] As stated in paragraph [32] above, the ponds' location and size are conceptual in nature. Subdivision, as well as earthworks, will likely change the contouring of the land, thereby affecting the catchment flows. The locations currently shown have been selected based on a review of the existing topography and will be located in general accordance with the Structure Plan. This provides some flexibility over the ultimate location (and size) of the detention ponds, which will be confirmed as part of the development's subdivision and engineering design. However, any changes would need to be consistent with, and implement, the requirements of the Stormwater Management Strategy.[11]

[35] I note that the geometry / size of the ponds has altered (increased) since the 2022 Stormwater Management Strategy was published, to further control downstream erosion risks.[12] This is why the updated maps do not match the previous locations in Figure 5.2 in the 2022 Stormwater Management Strategy precisely.

Uncertainty of the timing of infrastructure works

[36] The proposed timing for delivery of the Council-led stormwater infrastructure work has been outlined in the draft work programmes for the 2024-2034 Long Term Plan (LTP).

9 Statement of Evidence of Amanda Coats dated 3 November 2023, at [10](g).
10 Statement of Evidence of Amanda Coats dated 3 November 2023, at [32]-[34].
11 See also paragraph [39]-[41] below.
12 Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023 from [45].

A copy of the draft work programme is publicly available via the Council Meeting Agendas for the Strategy and Finance Committee[13].

Costs required to establish the required stormwater infrastructure

[37] The costs required to deliver the Council-led infrastructure have been estimated and included in the draft work programmes for the 2024-2034 LTP. The cost of the remaining infrastructure that would be built by the developer is to be borne by the developer, subject to any possible contribution by the Council upsizing pipes to service upstream catchments.[14] These costs have not been determined; only the costs associated with the Council-led infrastructure have been calculated to date.

G. RESPONSE TO JACK OUT ON BEHALF OF SUBMITTER 51

[38] This was the only other stormwater expert evidence lodged on PCG. As a general comment, there appears to be a lack of understanding as to the overall Stormwater Management Strategy and/or of the proposed specific mitigation measures.

[39] The intention of the Stormwater Management Strategy is to ensure the effects of development can be appropriately managed when having regard to the proposed plan change and surrounding environment, and to inform what stormwater mitigation may be required. For the reasons explained in the s 42A Report and this reply, the Stormwater Management Strategy provides a robust framework to inform development and the management of stormwater (and erosion) effects.

[40] I agree with Mr Out that the ponds are 'indicative only' in the sense that their dimensions and placement will be confirmed at the subdivision stage. However, I do not consider it is necessary to undertake detailed design in order to provide certainty as to the location of the ponds, given this is a Plan Change process, not an application for resource consent.

[41] In relation to the 'indicative' location of the identified stormwater ponds, I also note that any adjustments would need to be made with careful consideration of their impact

13 20 September 2023 Strategy and Finance Committee Agenda
14 See paragraph [27] above.

on the stormwater strategy and on other (non-stormwater) elements within the Structure Plan.

[42] Further clarification on specific topics is provided below.

Council-led infrastructure

[43] Council-led infrastructure is identified in Appendix B – Figure 01 – October 2023 (refer to **Attachment B**). This document was circulated after the pre-hearing meetings in October 2023. This should address the query raised by Mr Out in paragraph [11] of his evidence.

Perimeter swale function

[44] Mr Out's evidence states that "*the stormwater in [the] swales will be allowed to soak into the edge of the gully*".[15] The purpose of the perimeter swales is to prevent stormwater runoff flowing over the edges of the gullies. The swales will be used to collect and convey runoff to a controlled discharge point to the bottom of the gully, as described in the Stormwater Management Strategy and the s 42A Report.[16] Subsoil drainage will also be incorporated into the swale design to ensure the gully slopes are not saturated. This is demonstrated in the example diagrams provided in the s 42A Report[17] and Figure 7A.1.

[45] The location of the perimeter swale is discussed in the Stormwater Management Strategy, the s 42A Report, and Ms Copplestone's s 42A report - Planning.[18] They are also shown on Structure Plan Map 7A.4 based on the indicative residential areas presented in the Structure Plan (as amended by the s 42A reports).

[46] This should provide clarity to the points raised by Mr Out.

15 Statement of Evidence of Jack Out dated 1 November 2023, at [11].
16 At [40], and Appendix A (Stormwater Management Strategy) at Section 5.2 and 5.3 to Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023.
17 At Appendix E.
18 At [64], Appendix A (Stormwater Management Strategy) at Section 5.2 and 5.3, and Section 42A Technical Report of Anita Copplestone dated 15 September 2023 at Topic 4, section 1.1.3.4.2 at [61].

Alternative mitigation

[47] Mr Out states that "*comment has been made that piped infrastructure and the use of rainwater tanks will be both expensive and of little value*".[19] Both of these potential mitigation measures were addressed in the s 42A reports (Stormwater, Planning) as alternative or supportive stormwater mitigation methods.[20]

[48] In summary, the mention of piped infrastructure was in relation to providing oversized pipes to provide underground storage. This is still an option that a developer could consider, but based on the high-level objective of the stormwater assessment to inform PCG, as well as the sheer volume of pipework that would be required to mitigate the effects of the increase in stormwater runoff, this was not explored any further as part of the overall stormwater strategy.

[49] The use of rainwater tanks was not considered to be an overall solution for stormwater management due to the inability to manage it as a control measure. This is further explained in the s 42A Report.[21] However I do agree that it is a good water sensitive design option that could provide an added level of redundancy. It would be inappropriate to use private rainwater tanks as part of a catchment-wide management strategy due to the sensitive receiving environment and implications of increased runoff. However, given the potential benefit it may add for stormwater management, impact on potable water demand, and general awareness of water sensitive design, Council may wish to require rainwater tanks anyway.

Pond location and configuration

[50] In response to Mr Out's query in paragraph [12], Appendix B of the s 42A Report and the technical memorandum *Proposed Stormwater and Stream Erosion Mitigation* (GHD, 28 August 2023) identify where the ponds are in relation to each stream and whether they are recommended to be built offline or online of the stream.

19 Statement of Evidence of Jack Out dated 1 November 2023 at [11].

20 Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023 at [59], and Section 42A Technical Report of Anita Coppleston dated 15 September 2023 at Topic 1, section 1.1.3.2, [24]-[36].

21 Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023 at [59].

[51] Details of the outlet structures are not considered to be necessary at this stage, but would be a requirement of any resource consent application. In addition, Council's ESLD requires protection works for all outlets to natural watercourses. These design details are required as part of the engineering approval process.

[52] All assumptions used to inform the Stormwater Management Strategy are provided in both the Stormwater Management Strategy report (2022) or the updated modelling memorandum, both of which are appended to the s 42A Report. Providing further detailed design is not considered necessary as the geometry, location, and size of the detention ponds are dependent on future subdivision layout and catchment routing. However, it is recommended that a reference to the Stormwater Management Strategy be made under Section 7A.4, Methods.

H. RESPONSE TO PAUL THOMAS ON BEHALF OF SUBMITTER 58

[53] Several topics have been raised under this evidence as it pertains to stormwater management and the provision for stormwater mitigation as part of a current resource consent application.

Current resource consent applications

[54] The evidence speaks to a proposal submitted for a 13m high "dam" within the gully that could be utilised to provide attenuation.[22] I understand this is a reference to a developer's proposal to build such a dam in Gully 1, where an offline pond is currently identified as part of the Stormwater Management Strategy. At the outset, I do not understand that any 13m high 'dam' has been approved by the Council. Further, while I recognise that 'road crossings' provide potentially practical opportunities for stormwater attenuation, the Council has endeavoured to utilise the proposed road crossings as much as practicable already. In my view, any stormwater mitigation in this location must also consider the ecological and landscape constraints as well as the mitigation provided by attenuating at that specific location.

[55] At a high level, when considering the limited information provided as part of the referenced resource consent application and the overarching Stormwater

[22] Statement of Evidence of Paul Thomas dated 27 October 2023 from [19].

Management Strategy, I have identified (inter alia) several issues that would need to be addressed from a stormwater perspective in relation to the proposed 'dam':

(a) An offline pond is presented under the Stormwater Management Strategy as it minimises the effects on the ecology of the site and addresses the vegetative constraints. It was deliberately placed as shown in the Structure Plan because of the large open space and access provided from the future road. It was also deliberately placed offline and limited in size to manage the impact on the stream and give effect to the National Policy Statement for Freshwater Management 2020 (**NPS-FM**). The proposed dam referred to by the submitter and significant ponding volume does not give appropriate consideration to the ecological or vegetative constraints, and it is not clear how it would meet the NPS-FM.[23] There does not appear to be any assessment of environmental effects (AEE) on ecology or the vegetative constraints that is considered necessary for the type of work they are proposing.

(b) The mitigation in the application is only for the 1% AEP storm event. There has been no assessment on more frequent events, which is a requirement of PCG and also required under the ESLD.

(c) Consideration of the soil characteristics, impacts of uncontrolled flow from the top of the catchment, and the effects of their proposal has not been provided. Attenuating the flow at the bottom of the stream does not provide any benefit to the flow effects at the top of the stream. It does not appear that an erosion threshold analysis has been carried out, and the assessment has only focused on peak flow rates, which is inappropriate for this receiving system.

[56] There is reference to a 100m long culvert being proposed, with justification provided against Dr Forbes' assessment of the stream effects.[24] It is important to note that Table 3 in Dr Forbes' s 42A Report is the *sum* of the culverts proposed by the Stormwater Management Strategy. There are no culverts proposed to be 100m in length, as this is

[23] The NPS-FM is further addressed in the Statement of Reply Evidence by Dr Adam Forbes.
[24] Statement of Evidence of Paul Thomas dated 27 October 2023, at [116].

unlikely to provide suitable provisions for fish passage. Further, any proposal would need to be considered against the effects hierarchy, as Dr Forbes notes in his reply.

[57] Based on the reasons provided above, I do not believe that the stormwater mitigation put forward with the resource consent application would fit within the Stormwater Management Strategy or ESLD.

The provision for Stormwater Management Plans (SMP)

[58] Mr Thomas states that, because Council will be delivering the infrastructure within the gullies, the requirement for an applicant "*to submit a Stormwater Management Plan as a performance standard requirement is clearly inappropriate*".[25] The SMP that would be developed by Council for the gully systems will make provisions for the upstream catchment as allowed by PCG. However, this does not negate the need for any proposed development to also manage the effects of that development, especially since Council is not responsible for all of the in-gully infrastructure. The technical assessments have shown that multiple levels of controls are required through each gully catchment. Furthermore, each development proposal must demonstrate that they are not creating adverse effects. Examples of what would need to be demonstrated in a development's SMP include:

(a) How the perimeter swale is to be incorporated into the subdivision design.

(b) How stormwater will be managed in terms of meeting impervious percentages, overland flow paths, appropriate sizing of reticulation, etc.

(c) How ponds on the promontories would be incorporated into the gully systems and downstream stormwater systems.

(d) How the increase in runoff generated from development will be managed in accordance with the Stormwater Management Strategy.

(e) How flow and velocities will be managed to limit both peak flow from the development and the erosive forces of that flow.

[25] Statement of Evidence of Paul Thomas dated 27 October 2023, at [86].

North Village wetland feature

[59] The provision for a wetland feature has been questioned because it takes away developable land and Mr Thomas considers that a wetland could instead be incorporated into the gully.[26]

[60] Consultation with Rangitāne has made it clear that stormwater management for water quantity purposes is to be separated from the creation and restoration of wetlands, and providing a wetland feature within the detention pond may not be acceptable.

[61] In addition, stormwater treatment is required on the promontories before discharge to the gullies. A centralised wetland is much more efficient and practicable than distributed systems if there is sufficient space to allow for this type of feature.

Vesting of perimeter swales

[62] Any resource consent application lodged with the Council will require a geotechnical engineering report, which will better define the location of the setback boundaries indicated on the Structure Plan. Any proposed earthworks to create more developable area will also require a geotechnical investigation. This will effectively set the location for the stormwater perimeter swale and will help inform the exact area that is to be set aside for stormwater management and vested to Council.

I. RESPONSE TO LES FUGLE ON BEHALF OF SUBMITTER 58

[63] The submitter has commented on several topics, as outlined below. In many instances these reflect the evidence prepared by Mr Thomas, for which references have been made for brevity purposes.

Gully setback

[64] The proposed setback has been challenged by the submitter.[27] The 5m setback for the stormwater perimeter swale is what I consider to be the maximum width that would

[26] Statement of Evidence of Paul Thomas dated 27 October 2023, at [147].
[27] Brief of Evidence of Les Fugle dated 4 November 2023 at [21], [38]-[41].

be necessary to intercept flow from the rear section of lots to convey it to a single discharge point.

Stormwater

[65] The attenuation ponds proposed in the Stormwater Management Strategy are provided for not only mitigating the increase in runoff generated by development, but also for reducing the rate of erosion within the gullies to what would be expected before development. As discussed in paragraph [55] above, the resource consent application referred to in the submission does not sufficiently address the potential for erosion (amongst other things), and I do not consider this can be relied on in the context of this plan change.

Wetland

[66] The wetland feature has been challenged by this submitter. Whilst a wetland is not a requirement from a stormwater perspective, other factors must be considered, as discussed in paragraphs [60] and [61].

J. PLAN PROVISIONS

[67] Having regard to the matters discussed above, I have recommended further changes to the notified provisions. I understand these changes have been implemented by Ms Copplestone, including:

(a) Revisions to Figure 7A.1 to provide clarity around the function and purpose of the perimeter swale;

(b) Clarification on the purpose of the stormwater utility corridor width requirement – with provision for continuous access and maintenance, and greater clarity over the width being a maximum of 5 metres; and

(c) Referencing the Stormwater Management Strategy as a part of the Masterplan under the Section 7A Methods to highlight the sensitivity of the receiving environment and importance of the strategy. I note that the Stormwater

Management Strategy will be updated to reflect the recent recommendations coming out of the s 42A Report.[28]

28 November 2023

Allison Reiko Baugham

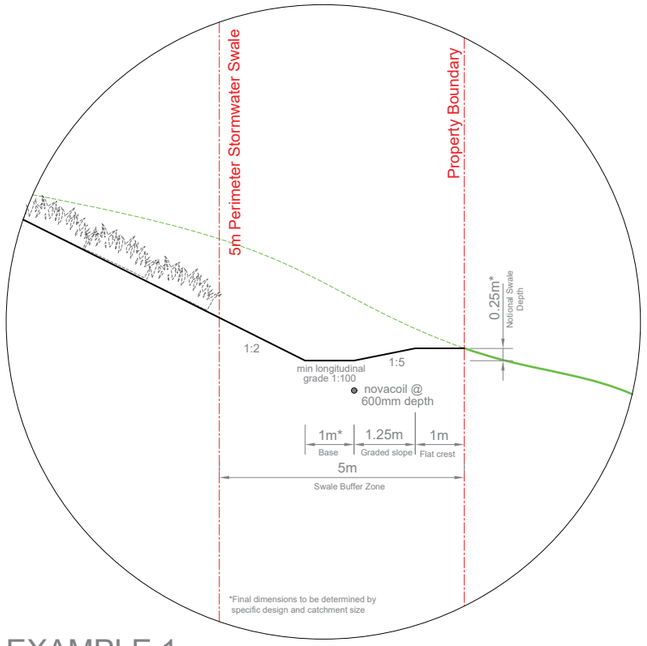
[28] Section 42A Technical Report of Allison Reiko Baugham and Tony Miller dated 15 September 2023 at [63].

K. ATTACHMENTS

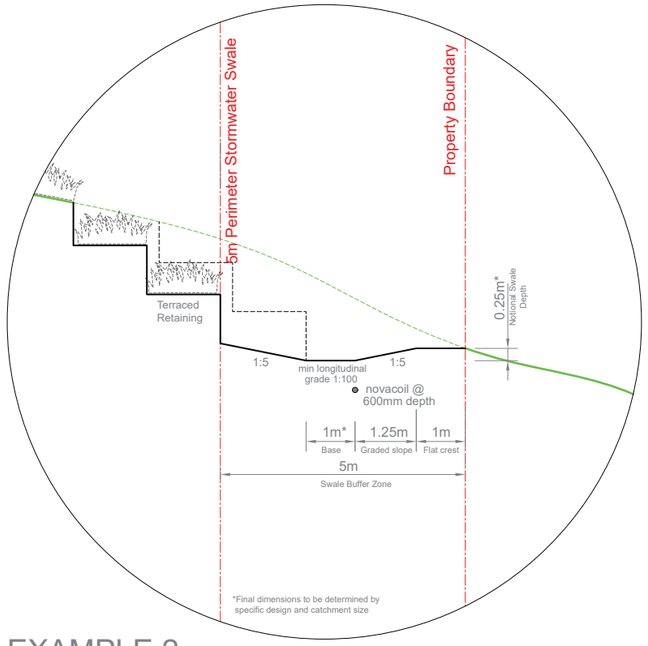
- **Attachment A**: Amended Figure 7A.1
- **Attachment B**: Figure 01 – October 2023

CROSS-SECTION EXAMPLES - STORM WATER SWALE

Attachment A



EXAMPLE 1



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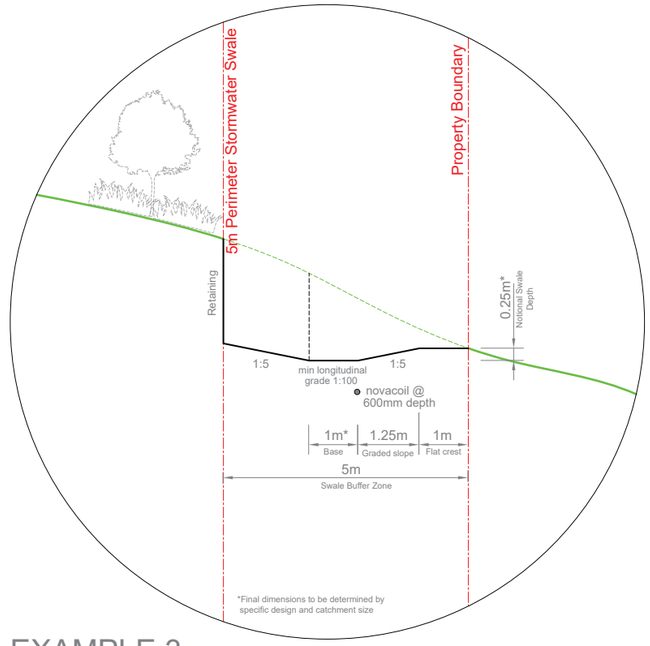

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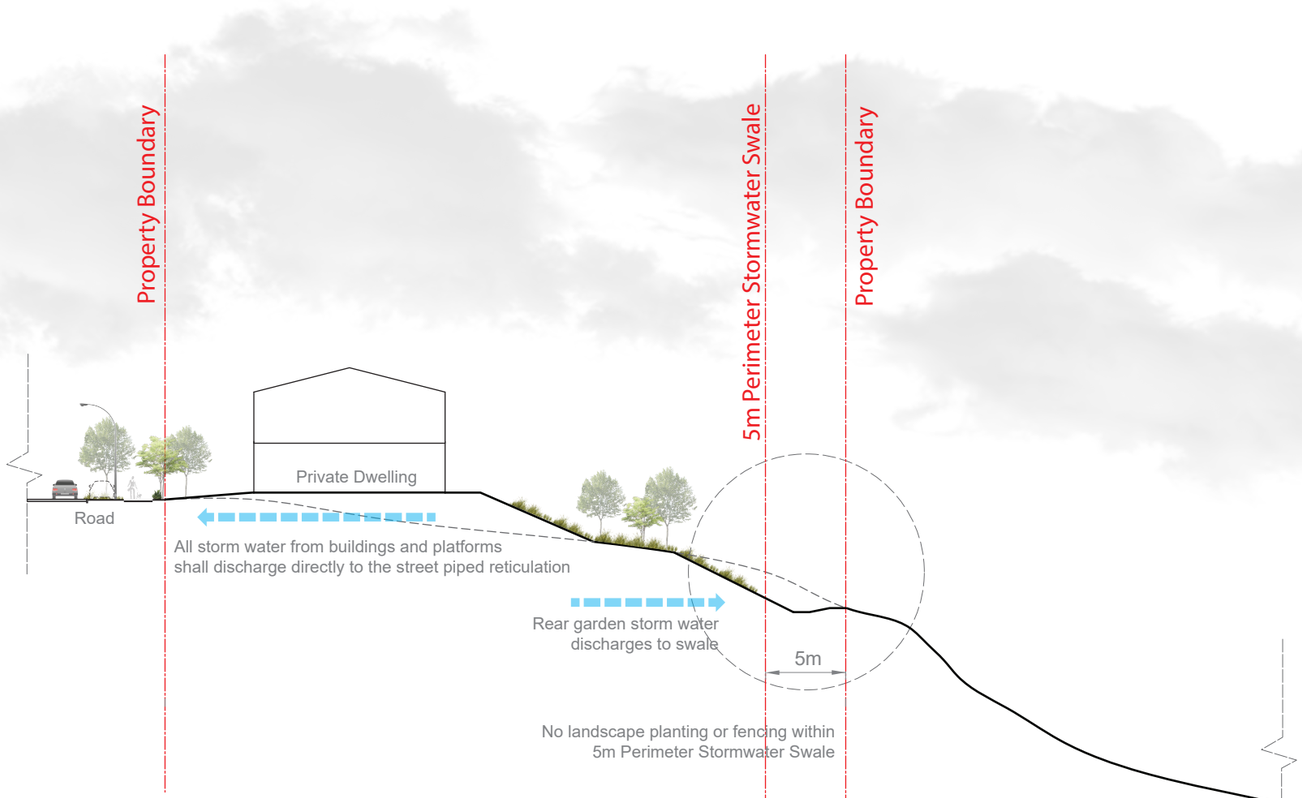
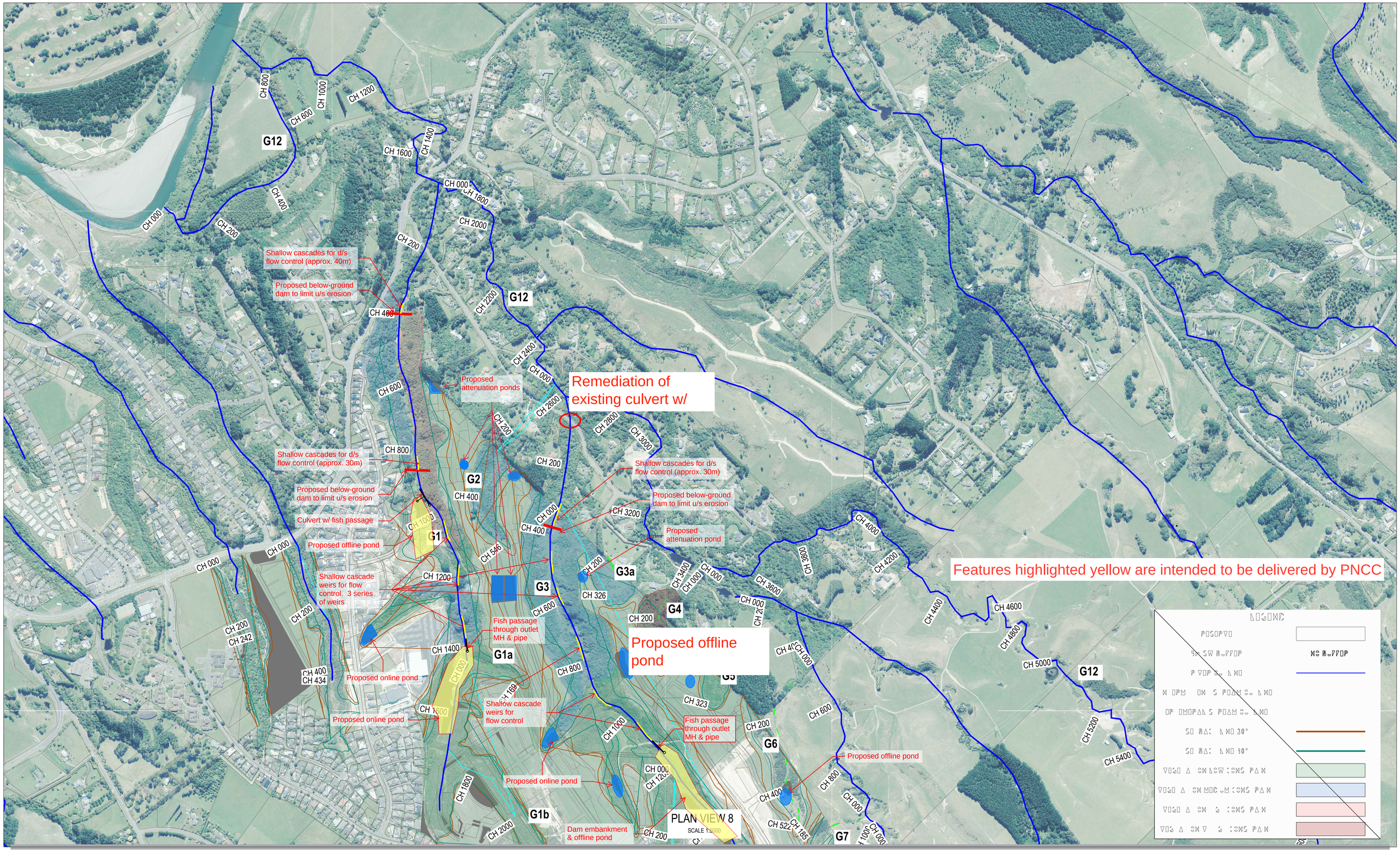


TYPICAL CROSS SECTION

Attachment B



N

0 50 100 150 200 250m

SCALE 1:5000 AT ORIGINAL SIZE

PALMERSTON NORTH CITY COUNCIL
AOKAUTERE STORMWATER PLAN

PLAN VIEW 1
GULLY 1, 1A, 1B, 2, 3, 3A, 4, 5, 6, 12

Project Number 12588291
Revision A
Date 05.2023

Figure 01

Plot Date: 31 May 2023 - 3:03 pm Plotted by: Clay O'Donnell Cad File No: N:\NZ\Palmerston North\Projects\51\12588291\CADD\Drawings\12588291-C100-C106-RA.dwg